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Drink Plants of the North American Indians.

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These plants may be considered under three heads:—

1st. Those yielding alcoholic liquors.

2d. Those yielding stimulating, exhilarating or intoxicating principles other than alcohol.

3d. Those furnishing palatable juices, or, by infusion, pleasant beverages more or less used to quench thirst.

As foreign to my purpose, I shall exclude all plants from which drinks are prepared only for medicinal uses.

1. Plants yielding alcoholic liquors.

All authorities substantially agree that American Indians, north of Mexico, had not acquired the knowledge of preparing alcoholic drinks at the time of the landing of Columbus, and that, whatever their vices may have been, they were free from that of drunkenness. Thus the missionary priest Gabriel Sagard, in his History of Canada (1636), after inveighing against intemperance, says:

"Our savages, in their feasts, are, thank God, free from such misfortune, for they use neither wine, beer nor cider; if any one among them asks for a drink, which very rarely happens, he is offered fresh water, not in a glass, but in a dipper or off the kettle itself from which he freely drinks and is thus saved from drunkenness, a great blessing to the body and soul, for it is likely that if they had wine they would become as intemperate as ourselves."

In Mexico, the Maguey (*Agave Americana*) has been cultivated from time immemorial for the abundant sap, or aguamiel, which collects in the cavity made in the heart of the plant by the removal of the young central leaves and is then fermented into pulque, the national drink of Mexico. Pulque smells much like half turned buttermilk, but is cooling, refreshing, nutritious and stimulating. It contains 3 to 4 per cent. of alcohol and is therefore about as strong as beer. The historian Sahagun says that long before the conquest, the use and abuse of pulque were so general that one of the Aztec kings forbade the sale of it and punished drunkenness with death. The Mexican liquor, mescal, or vino mescal, manufactured by distillation from the baked, pounded and fermented heads of several species of *Agave*, was unknown to the Aztecs, who like other American aborigines were ignorant of distillation, an art introduced from Europe. They only knew the first part of the process, how to macerate and boil the baked heads in water and ferment the decoction, so as to obtain a sort of "mescal beer" which, however, does not appear to have been a popular beverage.

The discovery, in some parts of Mexico, of crude stills constructed of native material, has led some authors to think that distillation may have been practiced on this continent before the coming of Columbus, but there is no ground for such belief in the accounts of the first explorers nor in the Indian traditions.

Agave Americana does not grow naturally north of Mexico. Of our few native species of *Agave*, none produce the abundant sap necessary for the making of pulque, and they are mostly used for food purposes. The Indians of Arizona and New Mexico, however, according to Col. Cremony, who lived several years among them before our Civil War, knew then how to prepare "mescal beer" from the heads of *Agave Parryi* and *A. Palmeri*.

According to Oviedo and Von Humboldt, maize was used in the religious rites of both Mexicans and Peruvians, and sugar procured from it, as well as a vinous liquor called chicha, "drunkenness having already become frequent under the Aztec dynasty." How much of this drunkenness is attributable to chicha and how much to pulque would be difficult to determine. It is probable enough that both beverages were important factors in the

demoralization and degeneration of the Aztecs which enabled Cortez, with a handful of men, to conquer the whole empire of Montezuma.

The cultivation of Maize, as we know, spread rapidly northward from Mexico, so that even before the days of Columbus it was the principal crop of all the agricultural Indians from the Rio Grande to the St. Lawrence and from the Atlantic to the Colorado of the West. Considering the abundance of corn among our Indians, and their craving for all intoxicants, it seems almost incomprehensible that the primitive and very simple art of making corn beer should never have found its way north of the Rio Grande.

For several generations, the Apaches of Arizona and New Mexico have been known to prepare from corn an alcoholic drink which they called tizwin or tulpi. They are extremely fond of it and have ignored or defied all ordinances for its suppression; tizwin formerly figured prominently in all their ceremonial dances which were generally preceded by a long fast in order the better to experience its full intoxicating effects. It is one of the strange circumstances of this obscure subject that the Apaches have always been nomadic, hunting and plundering Indians, seldom planting any vegetables and always more inclined to steal corn than to raise it. On the other hand, their agricultural neighbors, the Pimos, Papagos and Pueblo Indians, with always plenty of maize in stock, do not seem to have indulged in tizwin although they must, of course, have known its preparation and effects; their abstinence was probably a matter of indifference, perhaps of principles; caring less for intoxicants than the roving and murderous Apaches, they had not yet developed a taste for it.

I am unable to determine the exact time when the Apaches began the manufacture of tizwin; the first explorers of California, Arizona and New Mexico say nothing about it or any other alcoholic drink. I am informed by an army officer, stationed at the San Carlos agency, Arizona, that the old men of the tribe say that it began long before their time, that their fathers learned it from the Chiricahuas (then dwelling on the Mexican border), who themselves learned it from the Mexicans. But it seems impossible that this knowledge should have reached the Indians of Arizona, be-

fore the conquest of Mexico, without spreading to all or most agricultural and corn-raising Indians, so that, in the absence of more positive information, we may assume that it was obtained from the Mexicans, or Mexican Indians, who towards the end of the last or the beginning of this century traded among the tribes north of the Gila river, or were carried into captivity to their rancherias. This assumption is strengthened by the fact that the Apaches are of northern origin, and that none of their many tribes ever lived in Mexico. From the Mexicans, likewise, and at about the same time, in my opinion, came the knowledge of the other alcoholic beverages prepared by our southwestern tribes.

It is worth noting that at the only part of the American continent trodden by the foot of Christopher Columbus, namely the coast of Venezuela, the great discoverer observed and recorded the two alcoholic drinks used by the natives; they were the same as in Mexico, one prepared from corn, the other from the Maguey.

The most striking botanical feature of southwest Arizona and northern Sonora, as well as one of the wonders of the vegetable world, is the far-famed Giant Cactus (*Cereus giganteus* Engelm.), the Suhuara or Pitahaya of the Mexicans, a fluted column 30 to 50 feet high, crowned, in season, with handsome pink flowers. The fruit is two to three inches long, full of a rich crimson pulp of fine flavor and a great dainty to the Indians and Mexicans of the region. From it they prepare a clear light-brown syrup which is used as a substitute for sugar, and a fermented liquor having the taste and smell of sour beer, although somewhat stronger. The still larger and sweeter fruit of *Cereus Thurberi* Engelm. or Pitahaya dulce of Sonora and Lower California, is used for the same purposes. According to Colonel Cremony, already quoted, "It is upon this liquor that the Pimos, Maricopas and Yumas get drunk once a year, the revelry continuing for a week or two at a time; but it is also a custom with them to take regular turns so that only one-third of the party is supposed to indulge at a time, the remainder being required to take care of their stimulated comrades and protect them from injuring each other or being injured by other tribes."

The fruit of several species of *Opuntia*, especially *O. Tuna* Mill. and *O. Ficus-Indica* Haw., has also been used by Mexican Indians to make an intoxicating drink, called colonche, with a

pink color and the taste of hard cider. They peel and then press it; the juice is passed through straw sieves and placed by the fire or in the sun where it begins to ferment in about an hour. We also have species of *Opuntia* available for the purpose in our southwestern territory but I am not aware that they ever were utilized in this way.

Several species of *Yucca*, notably *Y. baccata* Torr., *Y. macrocarpa* Coville and *Y. Treculeana* Carr., of our southwestern territory and northern Mexico, bear a fleshy, banana-like fruit which is delicious when ripe. It contains a large proportion of sugar and is easily converted by the Chihuahua Indians into a fermented beverage which is sometimes distilled by the Mexicans into indifferent aguardiente.

The Mezquite (*Prosopis juliflora* DC.) is by far the most common tree or shrub of the immense desert tracts drained by the Rio Grande, Gila and Lower Colorado, as it is the most useful to their inhabitants, supplying both food and fuel. The fruit is a bean-like pod containing more than half its weight of nutritive principles, especially sugar in the proportion of 25 to 30 per cent.; when cooked, pounded, mixed in water and strained, it yields a very nutritive and pleasant beverage called "atole;" this readily undergoes fermentation whereby a kind of beer is produced, formerly much used by the Colorado and Gila River Indians.

Another species of Prosopis (*P. pubescens* Benth.), called Screw Bean or Tornillo and also very abundant in the same region, bears likewise a very saccharine fruit used in the same way.

This ends the list of plants yielding alcoholic liquors. It appears that the only United States Indians preparing these liquors were those of our southwestern border. The most obvious reason for this geographical peculiarity is that these Indians have always had relations with the Mexican natives and were visited at a very early date by white men; thus Arizona and New Mexico were pretty thoroughly explored by Spaniards before Hudson entered the Bay of New York or the May Flower landed at Plymouth Rock.

We might perhaps account for the ignorance of our eastern Indians concerning "corn beer" which, after all, is only a vile beverage, but we may well wonder at their failure to make wine.

To say nothing of our many kinds of berries, more species of Grapes grow in this country than in all the rest of the world and, for many tribes, must have been a staple food; again, nothing is easier than to make wine, the process consisting merely in pressing out the juice and letting it ferment. It is strange indeed they should not have stumbled upon it.

2. Plants yielding stimulating, exhilarating or intoxicating principles not alcoholic.

While stationed on the Rio Grande, west of the Pecos, my attention was drawn to a plant, called Peyote, which appears to possess remarkable properties. It is *Anhalonium Engelmanni* Lem. (*A. fissuratum* Engelm.), a napiform, tuberculous cactus, 2–3 inches long and hardly rising above ground. Mexicans cut it into slices which are kept dry for medicinal purposes, being commonly used in fevers. It is principally as an intoxicant, however, that it has become noted along the Mexican border, being eaten raw or added to native tizwin to make it stronger. It is said that Indians or Mexicans partaking of this adulterated tizwin become temporarily crazy and uncontrollable.

Closely related to *Anhalonium* is the genus *Lophophora* recently separated from it by Prof. Coulter. *L. Williamsii* var. *Lewinii* Coult. (*Anhalonium Lewinii* Hennings) is a small hemispherical cactus, 2 to 3 inches wide, with the tubercles in 13 sinuous ribs, and covered above with silky hairy tufts. It is found in barren rocky soil along both sides of the lower Rio Grande and southward. It is said to be the Peyote or Peyotl of northern Mexico, and to possess rather ill-defined deliriant or intoxicant properties whether used alone or added to native drinks.

The "tops," under the name of Mescal Buttons, have been the subject of more or less investigation Lewin and Heffter found in them several alkaloids and at least two resinous substances, the latter being the active principles. An alcoholic extract, according to Lewin, produces in animals symptoms almost identical with those caused by strychnine, being in small doses a cardiac and respiratory stimulant.

Very different, however, were the results of careful experiments made by Dr. Prentiss and Dr. Morgan of Washington who found that the chief physiological effect was the production of

beautiful colored visions in an ever-changing and brilliant picture; it was attended with wonder and admiration, but no merriment, delirium or intoxication. The Kiowa Indians were formerly much addicted to the use of this plant in their religious ceremonies when dwelling on the Rio Grande and, although now living in the Indian territory, have not yet given it up. Each Indian chews and swallows 10 or 12 buttons at intervals between sundown and morning and then sits quietly for a day or two enjoying the pleasurable effects of the drug.

It is impossible to reconcile the results of Lewin with those of Prentiss and Morgan, and I am inclined to believe that they worked with different plants. Further experiments are much needed with all species of *Anhalonium* and *Lophophora*.

According to H. H. Bancroft, Mexican Indians used various herbs and roots to make their drinks more intoxicating, the most powerful of which "was a kind of mushroom which excited the passions and caused the partaker to see snakes and divers other visions."

In Lower California the Indians, says the same author, "found drunkenness in the fumes of a certain herb smoked through a stone tube and used chiefly during festivals." This herb was doubtless a species of *Datura*. According to Dr. Palmer, the California, Colorado River and Payute Indians prepare a beverage from the leaves and seeds of *Datura meteloides* which excites, intoxicates, and then stupefies them. It was also added to alcoholic drinks to render them more effective. The same species is the *Toloachi* of southern Texas and northern Mexico, a name also applied to the Mexican *D. quercifolia* H.B.K., and perhaps other species. The *Toloachi* has marked deliriant properties and is credited, in the popular mind, with having caused the insanity of the unfortunate empress Carlotta.

Another well-known plant which may be mentioned here is *Sophora secundiflora* Lag., the Frijolillo of Texas. The red bean-like seed contains an alkaloid, sophorine, a strong irritant-narcotic poison. According to Bellanger, the Indians near San Antonio formerly used it as an intoxicant, half a bean producing "delirious exhilaration followed by a sleep which lasts 2 or 3 days," and it is asserted that a whole bean would kill a man. I am not aware

however that it was used in infusion or decoction, or added to other drinks, although this is likely enough, the bean being very hard and difficult to chew.

The most interesting plant of this class is doubtless *Ilex Vomitoria* Aiton (*I. Cassine* Walt.), the Cassine or Yupon of our southern Indians. It is a handsome evergreen shrub or small tree with thick elliptical leaves about an inch long, crenate-serrate, very obtuse, and small bright red berries. It grows near salt water, never very far in the interior, from Virginia southward along the whole east and west coasts of Florida and the Gulf coast, to the Colorado river of Texas.

Prof. Venable, of the University of North Carolina, in 1883 found in the dried leaves 0.27 per cent. of caffeine. In a previous investigation he had found 0.32 per cent. He also determined that the leaves alone contain this alkaloid and that the two botanically allied species, *I. opaca* and *I. Cassine* L. (*I. Dahoon* Walt.) are entirely destitute of it. The only other kind of *Ilex* containing caffeine appears to be *I. Paraguayensis* St. Hil. of South America, the Paraguay tea or mate of Brazil which, according to Peckolt, averages 0.50 per cent. of the alkaloid.

Long before the advent of the whites, our Southern Indians were in the habit of drinking a decoction of the leaves of this plant, as testified by all early explorers. This decoction or "black drink," as it was called from its color, was used not only by all the coast Indians from Carolina to Florida and Texas, but also by the Indians of the interior on both sides of the Mississippi, the leaves being an important article of trade. It was prepared by thoroughly boiling in water the carefully toasted leaves, then allowing to cool, meanwhile stirring up briskly or pouring it from one bowl to another until it became frothy. Dr. E. M. Hale who gathered much information on the Cassine (Bull. no. 14, U. S. Depart. of Agriculture, 1891), and who appears somewhat biased in its favor, says:

"In my experiments I find that an infusion of cassine leaves with boiling water, after standing till cool, gives a scarcely perceptible taste and slight odor. This infusion, if boiled for half an hour, gives a dark liquid, like very strong black tea, of an aromatic odor, *sui generis*, not like coffee, but more like Oolong tea

without its pleasant rose odor. The taste is like that of an inferior black tea, quite bitter, but with little delicacy of flavor. It is not an unpleasant beverage, and I can imagine that the palate would become accustomed to it, as to mate, tea or coffee."

We may then assume that the "black drink" was a weak coffee or tea with a large admixture of tannin, and free from intoxicating effect. It also appeared to contain an ingredient with decided sudorific and diuretic properties.

Wm. Bartram in his "Travels in Florida" (1792), tells of his feasting with the Indian king of Apalachicola, spending the greater part of the night "in drinking cassine and smoking tobacco." He describes the ceremonious presentation of the conch-shells full of "black drink" to the king and his guests, but prudently abstains from expressing any judgment on the quality of the beverage. It does not appear to have been liked by the explorers to whom the hospitable Indians always offered it. Jean Ribault (1666) says: "I tasted it and did not find it very bad," which is faint praise. Dominique de Gourges (1567) "pretended to drink it but swallowed none of it."

It is likely enough that the Indians had several methods of preparing it, sometimes, for purposes of conviviality, making the decoction rather weak, but at religious festivals making it very strong and doubtless adding other ingredients, such as the Button Snakeroot (*Eryngium aquaticum*) and perhaps *Iris versicolor* or even *Lobelia inflata*, with the effect of imparting strong emetic properties to the mixture. At such festivals the Indians drank copious drafts of it which in a short time made them vomit freely and easily; they continued drinking and ejecting for one or two days until they had sufficiently cleansed themselves.

Dr. Hale, in the bulletin above referred to, states that sometimes the decoction was allowed to ferment and then became an alcoholic beverage "capable of causing considerable intoxication." It is strange he should make such an assertion when all the evidence he adduces, from many observers, clearly shows that it never had any such effect. Thus McCullough in his "Researches:" "This tea may have been slightly stimulating, but it seems to have had no other than a diaphoretic or diuretic effect;" also Le Moine in his "Narrative": "It strengthens and nourishes the

body and yet does not fly to the head, as we have observed on occasions of these feasts of theirs;" and Mrs. Oliver, as quoted by A. S. Gatschet: "It was very bitter and said to be intoxicating, but, if so, it could only have been when drunk to great excess, as it never seemed to produce any visible effect upon them." We can safely arrive at the same conclusion by the reflexion that no alcohol can be expected from a leaf practically destitute of sugar, or sugar-making elements.

It remains to be said that the "black drink" has never been used by the whites as an habitual beverage, not even in times when tea and coffee were almost unattainable luxuries; but that, considering the abundance of the Cassine along some 2,000 miles of our coast, it seems desirable to definitely ascertain its exact economic value.

3. Plants furnishing palatable juices or, by infusion, pleasant beverages and used mainly for the purpose of quenching thirst.

Among the plants furnishing wholesome and palatable juices the first place belongs to the Maples, specially the Sugar Maple (*Acer saccharum* Marsh.), White or Silver Maple (*A. saccharinum* L.) and the Red Maple (*A. rubrum* L.). It has been clearly shown that the Indians knew the value of the sap of the Sugar Maples, that they drank it and made sugar from it before the advent of the whites; thus the Recollect missionary Le Clercq (1675–1691) writes: "Our ordinary food was that of the savages, namely sagamite, or cornmeal, squashes and beans, to which we added, as seasoning, marjoram, purslane, a certain species of balm and small wild onions. Our drink was water from the brook, or if one of us was indisposed, we split the bark of a Maple from which flows a sweet sap, which is collected in a bark vessel and considered a precious remedy."

The principal use of the maple sap, however, was to sweeten food, as mentioned by Joutel, the companion of La Salle: "We arrived at Chicagou in March (1688) and did not have much food, but Providence gave us, to mix with our cornmeal, a manna, the sap obtained from maples which are common and very large in this region."

The primitive Indian method of making sugar, before the introduction of metal kettles, was to throw red-hot stones in vessels

of bark or wood, or again, to freeze the syrup repeatedly in shallow basins and throw off the ice.

Box Elder (*Acer Negundo* L.), one of our most widely distributed trees, also yields an abundant saccharine sap in the spring utilized by our northern and western Indians. Equally valuable, in this respect, is our White Walnut (*Juglans cinerea* L.), for "if tapped immediately before the leaves unfold, it yields a richly saccharine juice from which sugar may be obtained nearly, if not quite, equal to that from the Sugar Maple" (U. S. Disp.).

Most species of Birch (*Betula*) yield the same quality of sap, and the Indians undoubtedly knew its value, although they seem to have been ignorant of the very pleasing effects of modern "birch beer" obtained by fermenting the sap of *B. lenta* and *B. lutea*.

In our western deserts, where water is scant, nature provides pulpy juicy plants from which Indians can often quench their thirst. Chief among these are several species of cactus, especially of *Opuntia* whose fruit (prickly pear), as well as the fleshy leaves or joints, contain an abundance of wholesome juice. Besides *O. Tuna* and *O. Ficus-Indica*, already noticed, *O. Engelmanni* Salm. and 2 or 3 analogous species so abundant along our southwestern boundary are especially noteworthy. Cattle and sheep are very fond of the leaves of these plants which are to them food and drink during the dry season, so that flocks of sheep fed upon them need not be driven to water for several months.

Several species of *Echinocactus* may also be mentioned in this connection, especially *E. Visnaga* Hook. of the central plateau of Mexico and *E. Wislizeni* Engelm. of our southwestern territory; they are called Barrel Cactus from their appearance, the stem being sometimes 4 to 5 feet high and 1 to 2 feet in diameter. The pulp of the stem is full of watery juice of a pleasant acidulous taste and has often been welcomed by thirsty travelers.

Many species of *Agave* with thick fleshy leaves, although mostly used by Mexicans and Indians for food, contain a large proportion of watery juice which can easily be pressed out for drinking. This juice, although not unpalatable, has not the sweet taste which cooking alone develops in it. The Sotol (*Dasylirion Texanum* Sheele) of Texas and northern Mexico shares exactly the

properties of *Agave* as a food and drink plant, not only for Indians but also for bear and other animals. The very succulent young stems of *Agave* and *Yucca* are also prized by Indians who are often seen sucking them with marked enjoyment.

Another desert plant which the thirsty native utilizes is *Ammobroma Sonorae* Torr., the Sand-Food, a leafless parasite in the sand-hills of south Arizona and Lower California. The long creeping stems are not only a palatable food but also a good substitute for water.

Many plants contain mucilaginous, starchy or saccharine principles which are readily imparted to water by infusion or decoction, rendering it more nutritive and palatable, maple syrup or sugar, honey, or dried fruit rich in glucose being often added to the mixture. The flour of maize, as well as that of Mezquite and Screw Bean, are thus frequently used by Mexicans and Indians.

Salvia polystachya Ort. is largely cultivated in northern and central Mexico, under the name of Chia, for its small glossy seeds rich in mucilage and oil. After careful roasting they are ground into meal which, when thrown into water, expands to several times its original bulk, the mucilage rapidly dissolving; by the addition of sugar, lemon juice or orange-flower water, a very agreeable, wholesome and demulcent beverage is obtained still very popular in Mexico. Other species used for the same purpose are: *S. Columbariae* Benth., the California Chia, common in California and extending to Arizona and Mexico; *S. carduacea* Benth., of southern California and *S. tiliaefolia* Wahl, of northern Mexico.

Sometimes, tart or acidulous fruits were bruised in water to make it more cooling, refreshing and palatable. This was particularly the case with several species of Sumach: *Rhus glabra* L., *R. hirta* Sudw. and *R. copallina* L., east of the Rocky Mountains; *R. integrifolia* B. & H. and *R. ovata* Wats., of southern California and Lower California. *R. integrifolia* has very acid berries covered with a white oily efflorescence said to be even more tart than the pulp; they are frequently gathered by Indians and used fresh, dried or roasted in preparing a very refreshing drink. The fruit of *R. ovata* is described by Orcutt as being very acid, but coated with a thin crust having the consistency of wax, "as sweet and

delicious in flavor as the best of refined sugar" and formerly much collected by the natives; a combination of the acid pulp with the sweet crust making excellent lemonade.

In California, the *Manzanitas* are also used for this purpose. *Arctostaphylos Manzanita* Parry, the Common Manzanita, has a smooth apple-like fruit, 4–6 lines broad, reddish-brown when ripe, mildly astringent, but decidedly acid; it makes a pleasant cooling drink in summer. *A. tomentosa* Douglas has a somewhat smaller pubescent fruit.

Likewise used in this manner is the fruit of our two species of *Shepherdia*, *S. argentea* Nutt., the Bullberry of the Missouri region, and *S. Canadensis* Nutt., the Soapberry of the northern States and British America. That of the former contains 2 to 3 per cent. of free acid; that of the latter contains a small proportion of saponin, so that when triturated in water and beaten up it produces a thick foam which, when sweetened, is highly prized by the natives.

Other common native plants with tart fruit imparting a pleasantly acidulous taste to water are the Barberries, specially *Berberis Canadensis* Mill. of the east, *B. repens* Lindl. and *B. aquifolium* Pursh. of the Rocky Mountains and Pacific States, and *B. trifoliata* Moric. of Texas and Mexico.

Finally, we may note a few of the plants used in infusion to make aromatic teas. These plants are many; in fact, there is hardly any scented vegetable within reach which has not been used at some time by natives in preparing beverages, although perhaps oftener for medicinal purposes than to simply gratify the palate.

Sassafras tea, made from the root of the Sassafras tree, was a favorite substitute for Chinese tea in the South during our Civil War, and had always been appreciated by Indians, although they never suspected the superior charms of "root-beer." During the war for independence, the colonists used, as a substitute for the imported article, the leaves of New Jersey Tea (*Ceanothus Americanus* L.) which had at least the merit of being very common. It is quite probable that its virtues had been indicated by the natives. It does not contain theine but a very minute proportion of a bitter crystalline alkaloid, ceanothine. According to Porcher, when

properly dried and prepared, it is aromatic and not unpleasant, . . . certainly a good substitute for indifferent black tea." A very fragrant drink was also prepared from the Spice-Bush (*Lindera Benzoin* Blume), as well as from Wintergreen (*Gaultheria procumbens*) and Sweet Fern (*Myrica asplenifolia*). Much less acceptable must have been the infusion from Marsh Tea (*Ledum palustre* L.) and Labrador Tea (*L. Groenlandicum* Oeder) which, but specially the first, contain an acrid aromatic oil. According to Pursh and more recent observers, the dried leaves and flowers of the Sweet Goldenrod (*Solidago odora* Ait.) are a pleasant and wholesome substitute for tea.

While in western Texas, I became familiar with the Encenilla or Chaparral Tea (*Croton corymbulosus* Engelm.) quite abundant in that region. An infusion of the flowering tops makes a very palatable drink much used by Mexicans and Indians, as well as by our colored U. S. soldiers who prefer it to coffee. It appears to be entirely devoid of theine or any other stimulating principle except volatile oils. Other plants similarly used and valued in the same country and northern Mexico are *Bidens Bigelovii* Gray, *Salvia ballotaeflora* Benth., *Hedeoma Drummundii* Benth. and *Actinella odorata* Gray.

New Species of Leguminous Pods from the Yellow Gravel at Bridgeton, N. J.

By Arthur Hollick.

(Plates 258, 259.)

In a paper read before the Club some years since, and subsequently published in the Bulletin,* I mentioned the occurrence, in great abundance, of leguminous pods, in the Yellow Gravel sandstone at Bridgeton, N. J., with which were associated leaves of common eastern North American trees and shrubs, such as *Magnolia acuminata* L., *Asimina triloba* (L.) Don., *Persea Borbonia* (L.) Spreng. etc. In the final identification of the material these pods remained as incongruous elements, apparently representing

* Palaeobotany of the Yellow Gravel at Bridgeton, N. J., Bull. Torr. Bot. Club, 19: 330–333.

the genera *Mezoneurum* and *Lonchocarpus* (including *Derris* and *Pongamia*), which are of tropical or southern distribution and are not now known north of Mexico. The first named genus is not even reported from any part of the American continent, but is confined to tropical Asia and Africa, with a single species (*M. brachycarpum* Benth.) in Australia. The genus *Lonchocarpus* occurs in South America, Africa, Asia and Australia. The subgenus *Pongamia* is confined to Asia and Australia.

In the fossil state the species thus far described and figured in these genera are few and more or less unsatisfactory.

In *Mezoneurum* four have been recognized, viz.:

1. *Mezoneurum Radobojanum* Ung. Syll. Plant. Foss. Part 2, 28. *pl. 11. fig 1.*

2. *M. lygodioides* Ung. Denksch. Wien Akad. 11: 172. *pl. 8. fig. 18.* 1856.

3. *M. tripos* Ung. l. c. 173. *pl. 8. fig. 19.*

4. *M. dimidiatum* Wat. Plant. Foss. Bass. Paris, 244. *pl. 60. fig. 10.*

Of these the first and last mentioned are pods. The others are mere problematic organisms of but little value in this connection. All are from Tertiary strata in Europe.

In the genus *Lonchocarpus* two fossil forms have been recognized, viz:

1. *Lonchocarpus latifolius* Kth., a living species, reported from the Pleistocene (?) strata of Chorillo, Cuba, by P. P. Galtés, in a work entitled, "Memoria sobre unos fossiles vegetales encontrados en el Chorillo." *

2. *L. obtusifolius* Engelh. Abh. Isis, 1894. 7. *pl. 1. fig. 22;* Abh. Senckb. Naturforsch. Gesellsch. 19: 17. *pl. 3. fig. 1.* 1895; leaves from Tertiary strata in South America.

The only fossil representative of the subgenus *Pongamia* to which I have been able to obtain any reference is *P.*† *protogaea* Massalongo, Neu. Jahrb. Min. 1857, 778, where it is mentioned in a list of plants from the Tertiary strata of Monte Bolca, Italy. It was subsequently described in Atti Reale Inst. Veneto di Sci.

* This reference was given me by Professor Lester F. Ward, of the United States Geological Survey, but neither of us has had access to the work, and we do not know whether the fossil was a pod or a leaf.

† Spelled *Pungamia.*

Lett. ed. Art. (III.) 3: 769, 1858, and later both leaves and fruit were figured in "Specimen Photographicum," 97. *pl. 40. figs. 2, 3*, 1859, but I have unfortunately not had access to these works.

The exact geologic age of the Bridgeton sandstone has not been definitely settled, but it evidently represents late Tertiary or Pleistocene, containing a flora which is almost identical, in both species and genera, with that of the latitude of Virginia at the present time.

The main point of interest in connection with these pods is that whereas their former companions are yet represented, both in genera and species, in the living vegetation of the region, the genera to which they are referred are no longer to be found there, but are elements in a more tropical flora. The fact that I have been unable to compare them satisfactorily with living species would indicate, taken in connection with the other circumstances of their occurrence, that they represent the last struggle for life of these genera in this latitude, due to the changing climatic conditions which preceded the advent of the Ice Age. Previous to that time they were widely distributed throughout both continents. The north temperate species were obliterated, and only those which existed further south were able to continue their existence. This supposition is also strengthened by the reference of the fossil species found further south to the living *Lonchocarpus latifolius*.

The facts in regard to the past history and distribution of these genera are of the utmost significance when taken in connection with their present distribution. Several of the problems of their present distribution would be exceedingly difficult of explanation if we did not have these facts to guide us. The improbable theory of migration in recent times is no longer a necessary one, and we are led to the rational conclusion that genera, the species of which are now widely separated in different portions of the earth, were formerly of universal distribution but have become extinct over many wide areas where they formerly existed, due to changes in environment.*

* In this connection see "Zur Theorie der Entwickelung der jetzigen Floren der Erde aus der Tertiarflora." C. F. von Ettingshausen. Sitzb. Wien Akad. Wiss. Math. Naturwiss. Classe, 103: 369. 1894.

For purposes of comparison I have introduced figures of pods representing living three species, viz: *Mezoneurum cucullatum* L., *Pongamia glabra* Vent. and *Lonchocarpus neuroscapha* Benth. and copies of two figures representing fossils which have been referred to the first of these genera, viz: *Mezoneurum dimidiatum* Wat. and *M. Radobojanum* Ung.

The new species are:

MEZONEURUM BRIDGETONENSE n. sp.

(Plate 258, Figs. 1–7.)

Pods 2¼ in. to 4 in. long by 1 in. to 1¾ in. wide in middle, obtuse and slightly recurved at end, abruptly rounded or attenuated at base; suture prominent, distant about ¼ in. from middle of nearest margin; reticulations more or less prominent laterally, extending from suture to farthest margin, with occasional cross connections, few or none between suture and nearest margin.

LONCHOCARPUS NOVAE-CAESAREAE n. sp.

(Plate 259, figs. 6–8.)

Pods about 2¾ in. long by 1 in. to 1¼ in. wide in middle, tapering to end and base, recurved at end, curved or recurved at base; suture prominent, distant about ¼ in. from middle of nearest margin; reticulations more or less prominent laterally, between suture and farthest margin, with cross connections which give an appearance of forking, a few more or less obscure and simple nerves between suture and nearest margin.

Explanation of Plates.

PLATE 258.

Figs. 1–7. *Mezoneurum Bridgetonense* Hollick.

PLATE 259.

Fig. 1. *Mezoneurum dimidiatum* Wat. Plant. Foss. Bass. Paris, 244. *pl. 60. fig. 10.*

Fig. 2. *Mezoneurum cucullatum* L. Cult. in Kew gardens. Specimen in Herb. Columbia College.

Fig. 3. *Pongamia glabra* Vent. Hong Kong. Specimen in Herb. Columbia College.

Fig. 4. *Lonchocarpus neuroscapha* Benth. From Mart. Fl. Brasil. 15: part 1 *pl. 99.*

Fig. 5. *Mezoneurum Radobojanum* Ung. Syll. Plant. Foss. part 2, 28. *pl. 11. fig 1.*

Figs. 6–8. *Lonchocarpus Novae-Caesareae* Hollick.

Contribution to the Pyrenomycetes of Maine.—I.

By F. L. Harvey.

The following list of Pyrenomycetes is based upon collections made by the Rev. Joseph Blake, and in the Blake Herbarium at the Maine State College, or in lists of Maine Cryptogams turned over to the writer by Mr. Blake before his death. To the above are added all the species, so far as known, that have been recorded from Maine in the literature upon fungi, together with such forms as have been detected by the writer since 1886. The list is of course incomplete, as each year several species have been added. It includes a few species not noted by Ellis from the United States, also several species not before reported from Maine.

Additional references to Maine species by collectors will be gratefully received.

We are under great obligations to Mr. J. B. Ellis and Mr. C. H. Peck for the examination of specimens.

Family ERYSIPHEAE.

1. *Sphaerotheca Humuli* (DC.). On *Spiraea salicifolia* L. and *Humulus Lupulus*, Orono (Harvey).

2. *S. Mors-uvae* (Schw.). On species of *Ribes*, Orono (Harvey).

3. *Erysiphe communis* (Wallr.). Herb. Port. Soc. Nat. Hist. (Fuller), Cumberland (Blake). Hosts not stated. On *Pisum sativum*, Orono (Harvey).

4. *E. Cichoracearum* DC. On dandelion leaves (W. C. Stevenson), as *E. Montagnei* Lev.; Harrison (Blake), as *E. phlogis* Schw. On various species of Compositae, Orono (Harvey).

5. *E. graminis* DC. Common on lawn grasses in shaded places, Orono (Harvey).

6. *Uncinula Necator* (Schw.). Very abundant on Delaware grapes, Orono (Harvey).

7. *U. circinata* C. & P. On *Acer dasycarpum*, Orono (Harvey).

8. *N. Salicis* (DC.). On *Salix* species. Very common, Orono (Harvey).

9. *Phyllactinia suffulta* (Reb.). On *Hamamelis Virginiana*, *Celastrus scandens* and *Alnus serrulata*. Very abundant, Orono (Harvey).

10. *Podosphaera Oxyacanthae* (DC.). On cultivated plums, Orono (Harvey).

11. *Microsphaera Vaccinii* (Schw.). Jackman (Harvey). On *V. corymbosum* var. *atrococcum* Gray.

12. *M. Alni* (DC.). On honeysuckle, Portland (C. C. Balles). C. & P. Ery. U. S. 20, as *M. Dubyi* Lev., which is regarded by Burrill as *M. Alni*. On *Alnus serrulata*, very common, Orono (Harvey).

13. *M. quercina* (Schw.). On *Quercus nigra*, Orono (Harvey).

Family II. PERISPORIEAE.

14. *Dimerosporium Collinsii* (Schw.). Wells (Blake). No host given, but probably on *Amelanchier*.

15. *Asterina Celastri* E. & K. On leaves of *Celastrus scandens*, Orono (Harvey).

16. *A. Gaultheriae* Curtis. On living leaves of *G. procumbens*. Common, Orono (Harvey).

17. *Microthyrium microscopicum* Desm. Cumberland (Blake).

Capnodium Pini B. & C. Berk. and Curt. North Am. Fungi n. 982, Me. (Blake).

18. *Eurotium herbariorum* (Wigg.). Common on neglected herbarium specimens, Orono (Harvey).

19. *Claviceps purpurea* (Fr). Common on various species of grasses, cultivated and wild about Orono (Harvey).

20. *Cordyceps militaris* (Linn.). Conidial stage in Blake Herb. as *Isaria farinosa*, also in the ascigerous form as *Torrubia militaris* Fr. Cumberland (Blake).

21. *Cordyceps ophioglossoides* (Ehr.). Cumberland (Blake).

22. *Hypomyces Lactifluorum* (Schw.). Portland (Fuller). Sprague's N. Eng. Myc. from S. Paris, Wells (Blake). On *Lactarius* in beech and birch woods. Orono, August (Harvey).

23. *H. violaceus* Tul. Parasitic upon *Fuligo septica* L. A single infested specimen found on moss at Greenfield, Me., Oct., 1895. (Harvey).

24. *Hypocrea rufa* (Pers.) Blake Herb. as *Trichoderma viride* Pers. Cumberland (Blake), Orono, on decaying wood (Harvey).

25. *H. Schweinitzii* (Fr.). Blake Herb. as *Sphaeria contorta* Schw. Cumberland (Blake.)

26. *H. Richardsoni* Berk. & Mont. Cumberland (Blake) Jour. Mycol. June, '86, p. 62, from Maine, but no authority. On willow and poplar, Orono (Harvey).

According to the recent investigations of Herman Schrenk (BULLETIN, **21**: 385) this form is a *Corticium* and should be *C. pezizoideum* (Schw.).

27. *Hypocrella Hypoxylon* Pk. Stems of living grasses, Me. (Scribner). Journ. Mycol. June, '86, p. 67.

28. *Epichloe typhina* (Pers.). On grass, July, Bradley, Me. (Harvey).

29. *Nectria cinnabarina* (Tode). Portland (Fuller). Cumberland (Blake). Orono (Harvey). Common on honey locust, rock maple, staghorn sumach and apple in the conidial stage (*Tubercularia vulgaris* Tode). On red raspberry, white pine, poplar and basswood we find a form (*Tubercularia nigricans* Fr.), which, if we are correct, should also be referred to *N. cinnabarina* (Tode.). In Blake's Herb. is *T. granulata* P. Cumberland (Blake). We find this mentioned only by Cooke (Vol. II., p. 557–8), where he seems to refer it to the above.

30. *N. Sambuci* E. & E. On *Sambucus Canadensis*. Oldtown (Harvey).

31. *N. coccinea* (Pers.). Cumberland (Blake). On dead branches of *Acer saccharinum*. Orono (Harvey).

32. *N. vulpina* Cke. Pushaw Lake, Oldtown, Aug., 1895 (Harvey).

33. *N. dispersa* C. & E. Maine (Blake), on pine bark. Jour. Mycol. Dec., '86, p. 133, as *Dialonectria dispersa* C. & E.

34. *N. episphaeria* (Tode). On species of *Sphaeria* upon *Alnus serrulata*. Orono (Harvey).

35. *Chilonectria Coryli* (Fckl.). Hard maple. Orono, Dec. (Harvey).

36. *Gibberella pulicaris* (Fr.). Blake Herb. as *Sphaeria pulicaris*. Cumberland (Blake).

Family TRICHOSPHAERIEAE.

37. *Venturia compacta* Pk. Orono (Harvey).

38. *Lasiosphaeria hirsuta* (Fr.). Oldtown, Aug., 1895 (Harvey).

39. *L. mutabilis* (Pers.). In Blake Herb. as *Sphaeria mutabilis* Pers. Harrison (Blake).

Family MELANOMMEAE.

40. *Rosellinia Desmazierii* (B. & Br.). Cumberland (Blake). On birch in Maine (Grev. 4: 106). Probably the Maine specimens were from Blake (?) Blake Herb. as *Sphaeria Desmazierii.*

41. *R. Clavariae* (Tul.). On *Clavaria spinulosa* Pers. Orono, Aug. (Harvey).

42. *Bombardia fasciculata* Fr. In Blake Herb. as *Sphaeria bombarda* Batsch, from Cumberland (Blake).

43. *Bertia moriformis* (Tode.). Rotten firwood, Orono, November; Oldtown, Sept., 1895 (Harvey).

44. *Melanomma pulvis-pyrius* (Pers.). Blake Herb. as *Sphaeria myriocarpa* Fr. Cumberland (Blake).

Family CERATOSTOMEAE.

45. *Ceratostoma spina* (Schw.). Blake Herb. as *Sphaeria spina* Schw. Cumberland (Blake).

Family AMPHISPHAERIEAE.

46. *Amphisphaeria Oronoensis* E. & E. *Sphaeria Oronoensis* E. & E. Journ. Mycol. 3: 117. On spruce timbers in a cellar in Orono, 1887 (Harvey). Also found on spruce in the woods.

47. *A. applanata* (Fr.). Blake Herb. as *Sphaeria applanata* Fr. Wells (Blake).

Family LOPHIOSTOMEAE.

48. *Lophidium compressum* (Pers.). Blake Herb. as *Sphaeria angustata* Pers. Cumberland (Blake).

Family CUCURBITARIEAE.

49. *Cucurbitaria elongata* (Fr.). Blake Herb. as *Sphaeria elongata* Fr. Cumberland (Blake).

50. *C. Berberidis* (Pers.). Blake Herb. as *Cucurbitaria Berberidis* Fr. Cumberland (Blake).

51. *Fraechiaea callista* (B. & C.). Cumberland (Blake). Blake Herb. as *Sphaeria callista* B. & C.

52. *Otthia morbosa* (Schw.)= *Plowrightia morbosa* (Schw.) Sacc. Common on *Prunus Pennsylvanica* and domestic plums. Orono (Harvey).

53. *Parodiella grammodes* (Kze.). Herb. Port. Socy. Nat. Hist. (Fuller) as *Dothidia perisporioides* B. & C.

Family SPHAERELLOIDEAE.

54. *Sphaerella maculiformis* (Pers.). Blake Herb. as *Sphaerella maculiformis* Pers. Cumberland (Blake).

55. *S. Smilacicola* (Schw.). Sprague's New. Eng. Mycol. (Proc. B. S. N. H. 6: 319 (Morse) as *Depazea Smilacicola* Schw.

Family GNOMONIEAE.

56. *Gnomonia Corylii* (Batsch.). Port. Socy. Nat. Hist. Coll. as *Gnomoniella Corylii.* Blake Herb. as *Sphaeria Corylii* Batsch. Cumberland (Blake). On leaves of *Corylus Americana.* Orono (Harvey).

57. *G. fimbriata* (Pers.). Harrison (Blake).

58. *G. errabunda* (R. et D.). Spragues N. Eng. Mycol. Portland (E. S. Morse) as *Sphaeria errabunda* Desm.

Family PLEOSPOREAE.

59. *Leptosphaeria fuscella* (B. & Br.). Blake Herb., Cumberland (Blake).

60. *L. Doliolum* (Pers.). Blake Herb., Cumberland (Blake).

61. *L. comatella* (C. and C.). Blake Herb., Cumberland (Blake).

62. *Ophiobolus porphyrogonus* (Tode.). Blake Herb. as *Sphaeria rubella* Pers. Cumberland (Blake).

Family MASSARIEAE.

63. *Marsaria inquinans* (Tode.). On dead maple limbs. Orono, Dec. (Harvey).

64. *Massariella scoriadea* (Fr.). Blake Herb. as *Sphaeria scoridea* Fr. Cumberland (Blake).

65. *M. pupula* (Fr.). Conidial stage on sugar maple, *Steganosporium pyriforme* Hoff. Orono, Nov. (Harvey).

Family VALSEAE.

66. *Diaporthe leiphaemia* (Fr.). Blake Herb. as *Valsa leiphaemia* Fr. Cumberland, Me. (Blake).

67. *D. Salicella* (Fr.). Proc. Bost. Soc. Nat. Hist. 6: 319 (Blake). Blake Herb. as *Sphaeria Salicella* Fr. Cumberland (Blake). This species, in the conidial form, was sent by Blake to Sprague, Berkeley and Curtis, and appears in their lists as *Discella carbonacea* B. & Br. On Willow, Orono (Harvey).

68. *D. syngenesia* (Fr.). Blake Herb. as *Sphaeria Frangulae* Pers. Cumberland (Blake).

69. *Valsa Americana* B. & C. Blake Herb. Wells and Cumberland (Blake).

70. *V. modesta* (Schw.). Blake Herb. Cumberland (Blake).

71. *V. deformis* (Fr.). On birch. The ferruginous stroma appearing as waxy spots on the bark. Orono, Dec. (Harvey).

72. *V. rufescens* (Schw.). Blake Herb. as *Sphaeria aculeans* Schw.=*Sphaeria rufescens* Schw. Cumberland (Blake).

73. *V. truncata* C. & P. Wells (Blake.)

74. *V. rhizina* (Schw). Berk. & Curt. N. A. F. (Blake).

75. *V. ambiens* (Pers). Wells (Blake). On willow, Orono (Harvey).

76. *V. salicina* (Pers.). Spermogonia in Blake Coll. as *Cytispora fugax* Fr. Cumberland (Blake).

77. *V. quaternata* (Pers.). Blake Coll. as *Sphaeria quaternata* Fr. Cumberland (Blake). The spermogonial stage (*Libertella faginea*) is very common on birch bark. Orono (Harvey).

78. *V. nivea* (Hoff.). Dead poplar. Orono, Dec. (Harvey).

79. *V. colliculus* (Wormsk.). In Blake Herb. as *Sphaeria colliculus*, which we have not been able to trace, but presume it is the above. Cumberland (Blake).

80. *Eutypella cerviculata* (Fr.). Orono (Harvey).

81. *E. similis* (Karst.). On *Alnus serrulata*, Orono, Sept. (Harvey).

82. *Eutypa spinosa* (Pers.). Blake Herb. as *Sphaeria spinosa* Pers. Cumberland (Blake).

83. *Calosphaeria ciliatula* (Fr.). On dead birch limbs. Orono (Harvey).

Family MELANCONIDEAE.

84. *Melanconis stilbostoma* (Fr.). Blake Herb. as *Sphaeria pulchella* and the spermogonia as *Nemaspora crocea* Fr. Cumberland (Blake). Sprague's New Eng. Mycol. Portland (E. S. Morse). On birch, Orono (Harvey).

85. *M. tiliacea* (Ell.). On *Tilia Americana*, Orono, Dec. (Harvey).

86. *Pseudovalsa profusa* (Fr.). Blake Coll. as *Sphaeria Sartwellii*, Cumberland (Blake).

87. *P. lanciformis* (Fr.). Blake Herb. as *Sphaeria lanciformis* Fr. Cumberland (Blake).

Family MELOGRAMMEAE.

88. *Valsaria exasperans* (Gerard). Harrison (Blake). maple, Orono, Dec. (Harvey).

Family DIATRYPEAE.

89. *Diatrypa stigma* (Hoff.). Orono (Harvey).

90. *D. platystoma* (Schw.). Hard maple. Orono (Harvey).

91. *D. disciformis* (Hoff.). On beech. Wells (Blake).

92. *D. albopruinosa* (Schw.). Blake Herb. as *Sphaeria Diesieni* Mont. Cumberland (Blake).

93. *Anthostoma microsporum* Karst. On *Alnus*. Wells (Blake). Orono (Harvey). Blake Herb. as *Diatrype microspora* Ell.

94. *Diatrypella quercina* (Pers.). Harrison (Blake). Blake Coll. as *Sphaeria quercina* Pers.

95. *D. verrucaeformis* (Ehr.). Blake Herb. as *Sphaeria verrucaeformis*. Cumberland (Blake).

96. *D. betulina* Pk. On dead birch twigs, Orono (Harvey).

97. *Phyllachora Trifolii* (Pers.). On clover leaves, Blake Herb. as *Polythrincuum Trifolii* Kze., which according to Cooke is probably the conidial form of the above. Harrison (Blake). Also in Blake Herb. as *Sphaeria Trifolii* Pers. Cumberland (Blake).

98. *P. Pteridis* (Reb.). On leaves of *Pteris aquilina*, Mt. Desert (Redfield). Common about Orono (Harvey).

99. *Dothidella betulina* (Fr.). Blake Herb. as *Dothidea betulina* Fr. Cumberland (Blake).

100. *D. Ulmi* Schw. Harrison (Blake).

101. *Dothidea Ribesia* (Pers.). Berk. and Curt. N. A. Fungi from Me. (Blake). Blake Herb. Cumberland (Blake).

Family XYLARIEAE.

102. *Hypoxylon coccineum* Bull. Blake Herb. as *Sphaeria fragiformis* Pers. Cumberland (Blake). On beech, Orono. Jackman (Harvey).

103. *H. enteromelon* (Schw.). Sprague's N. Eng. Myc. Portland (Morse). Blake Herb. as *Sphaeria enteromela* Schw.

104. *H. fuscum* (Pers.). Blake Herb. as *Sphaeria fusca* Pers., and *S. confluens* Willd. On dead alder, beech, etc., Orono. Jackman (Harvey).

105. *H. multiforme* Fr. Blake Herb. Cumberland (Blake). Common, Orono (Harvey).

106. *H. multiforme* var. *adultum* Fr. On yellow birch, Orono (Harvey). This form was named by Peck from specimens from Orono, and is not mentioned by Ellis.

107. *H. glomiforme* B. & C. Cumberland (Blake).

108. *H. cohaerens* (Pers.). Blake Herb. as *Sphaeria cohaerens* Pers. Cumberland (Blake). On beech, Orono (Harvey).

109. *H. Morsei* B. & C. Ber. & Curt. N. A. F. from Maine (Blake & Morse). Blake Coll. as *H. Blakei* B. & C.; Cumberland (Blake). On dead alder. Common, Orono (Harvey).

110. *H. perforatum* (Schw.). Dead wood, Orono (Harvey).

111. *H. rubiginosum* (Pers.). Orono (Harvey). Our form is regarded as varietal by Peck. *H. fuscopurpureum* Schw. Orono, Me., Oct., 1895 (Harvey).

112. *Daldinia concentrica* (Bolt.). Sprague's Cont. N. Eng. Myc. Portland (Fuller). Common on *Salix*, Orono (Harvey).

113. *D. vernicosa* (Schw.). Orono (Harvey).

114. *Xylaria polymorpha* (Pers.) Portland Soc. Nat. Hist. Coll. no. 54. Portland (Fuller); Cumberland (Blake).

115. *X. corniformis* Fr. Rotten wood and ground, Orono (Harvey).

116. *Angelina rufescens* (Schw.). Orono (Harvey).

117. *Hysterium pulicare* Pers. Cumberland (Blake).

118. *Hysterographium Fraxini* (Pers.). Blake Herb. as *Hysterium Fraxini* Pers. Cumberland (Blake).

Family HYPODERMIEAE.

119. *Lophodermium Juniperinum* (Fries). Port. Soc. N. H. Coll., No. 107, Portland (Fuller). In above Coll. as *Hysterium Juniperinum* Fr.

120. *L. Arundinaceum culmigenum* (Fr.). Sprague's New Eng. Myc. Wells (Blake). Common on grasses and sedges, Orono (Harvey).

121. *L. Pinastri* (Schrad.). Blake Herb. as *Hysterium Pinastri*

Schrad. Cumberland (Blake). Port. Soc. Nat. Hist. Coll., No. 100. Portland (Fuller).

Family DICHAENACEAE.

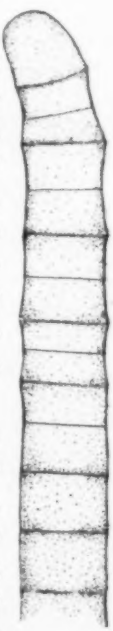
122. *Dichaena Faginae* (Pers.). On living beech. Cumberland (Blake).

A new Oscillatoria from California.

OSCILLATORIA TRAPEZOIDEA n. sp.

Trichomes aeruginous, forming a thin loosely-woven stratum of a dull blue-green color, firm, straight, 12–15 μ in diameter, slightly attenuated and in most instances somewhat arcuate at the apices, provided with a delicate sheath; articulations 2½–3½ times shorter than the diameter, 4μ–6μ long, with delicately granulose protoplasm, near the end of the filament prominently enlarged at the joints, giving, in sectional view, a somewhat trapezoidal form to the secondary cells; apical cell pyramidal or conical, sometimes bluntly rounded, not capitate; no calyptra.

Hab.: bottom of pond. Pasadena, California. October, 1895. Collected by Prof. A. J. McClatchie.



The hormogones are almost constantly arcuate at each end and, with few exceptions in opposite directions, so that they may be said to be somewhat sigmoid in form. In the mature filaments this arcuate character is, however, not always present, at least at both ends. In the same way the degree of attenuation and the shape of the end of the filament may vary to a considerable degree. Thus the apex may be globose or bulging, truncated, giving an almost square outline to the cell, or, going to the other extreme, it may be somewhat pointed, which is more common.

The bulging character furnished by the ends of the mature cells near the extremity of the filament is constant and peculiar to the species so far as is known. One might represent such a cell by placing, base to base, two low glass beakers with flaring edges. The two flaring edges would then be the ends of the primary cell, while the line made by the bases of the beakers could be taken as the new cell-wall thrown across, separating the two secondary cells.

The middle portion of the filament presents a straight, unbroken outline. Rarely a distinct constriction at all the joints of a filament occurs.

The difficulty of distinguishing between *Lyngbya* and *Oscillatoria* is well illustrated by this species. The existence of a sheath would naturally lead one to place it in the former genus, but the sheath in this case is extremely delicate and observed only in a few instances. In *Lyngbya* there is a distinct sheath containing numerous sliding hormogones.

In general character *O. trapezoidea* perhaps resembles *O. chalybea* Mertens, but is larger, shows no spiral arrangement and is clearly distinguished by the shape of the terminating cells of the filament.

JOSEPHINE E. TILDEN.

UNIVERSITY OF MINNESOTA, MINNEAPOLIS, MINN.

Botanical Notes.

Notes from Plum Island and Fisher's Island, N. Y.—It may be of interest to note the occurrence upon Plum Island and Fisher's Island, N. Y., of a few plants beyond their hitherto recorded range.

In August, 1892, the writer discovered *Juncus dichotomus* Ell. growing upon Plum Island, and during the past summer found it to be not rare upon Fisher's Island also.

Ligusticum Scoticum L. has been known for some years to be frequent upon Fisher's Island; in August, 1895, a station for it was found on the north shore of Plum Island.

In 1892 *Plantago elongata* Pursh (*P. pusilla* Nutt.) was detected growing on the south side of Fisher's Island. Near the east end of the same island is a small colony of *Euphorbia glyptosperma* Engelm. far out of its cited range.

CHARLES B. GRAVES.

NEW LONDON, CONN.

Schizohyllum Egelingianum E. & E., BULLETIN, 22: 439. I have lately found this fungus on a dead apple tree in Mr. Bull's orchard, at Mesilla, New Mexico; the specimens have been identified by Mr. Ellis. It is new to the U. S. flora.

T. D. A. COCKERELL.

N. M. AGR. EX. STA. Nov., 1895.

Reviews.

Introduction to the Study of Fungi: By M. C. Cooke, LLD. 8vo, pp. 360. London, Adam and Charles Black, 1895.

This is in some respects an elementary work and in others the author may presuppose a fair working knowledge of Fungi. It is designed for the use of collectors, not so much in giving rules for gathering and preserving specimens, as to put before them a large fund of information the bringing together of which has been the work of a long and busy life spent largely among the objects treated. Dr. Cooke has been one of the great workers in fungi from the standpoint of the collector and systematic student.

The work before us is divided into three parts, namely, organography, classification and distribution. Under Part I. chapters are given upon mycelium, carpophore, receptacle, fertilization and similar divisions. In general the plan under each heading is to pass from the simpler to the more complex forms, whether it be mycelium, spores or fertilization.

The main portion (Part II.) of the work takes up by chapters the leading groups and, mentioning the leading genera, introduces the reader to the types and their modifications.

While the work is fairly well illustrated it is noticed that many of the cuts have done service in the author's "Handbook of British Fungi," and other works. Some disappointment may be experienced in working with the index, as it is brief and the glossary has a similar fault. The classification worked out by Brefeld is presented in tabulated form, not that it is accepted by the author, but because suggestive and influential.

In its presentation the publishers might have been more fortunate in the selection of paper, etc. It is a heavy book without reason sufficient to the reviewer, and this will detract, in America at least, from its usefulness. BYRON D. HALSTED.

Contribution to the Flora of Yucatan. C. F. Millspaugh. Pub. Field Col. Mus. Bot. Ser. 1 : 1–64. *pl. 1–4.*

In this first botanical paper from the Field Columbian Museum, of Chicago, Dr. Millspaugh enumerates the species collected by him while accompanying Mr. Allison V. Armour's yacht

expedition to Yucatan last winter. He has also compiled in the publication the little previous knowledge of the region from the incidental collections of Johnson, Linden, Schott and Gaumer. His collections embrace 136 forms new to the region, of which two (*Euphorbia Armourii* and *E. astroites heterappendculata*) are described as new. We congratulate the Museum upon the character of its publications, and specially upon the style of issue, which seems to include all the excellent points of a perfect departmental serial.

The series included are: Botany, Geology, Zoölogy, Ornithology and Ethnology.

Die Laubmoose. Part 27, Hypnaceae. K. G. Limpricht. (Rab. Kryptfl. **4**: part 3, 1–64. 1896).

This part begins the third volume of the mosses, which is to include three families or groups as called by the author, comprising the Isothecieae, Brachythecieae and Hypneae. Of these, the Isotheciae are treated in this number, including the genera *Cylindrothecium*, *Climacium*, *Isothecium*, *Orthothecium*, *Homalothecium*, *Platygyrium* and *Pylaisia*. The *Camptotheciums* also are described and the key to the *Brachytheciums* is given. The keys, descriptions and illustrations are of the usual high order of merit, and we welcome this part as throwing much light on the species of the same genera occurring in the United States. We note that *Platygyrium repens* var. *sciuroides* is described from specimens so named and distributed by Sauter in Breutel's Musci Frondosi, No. 296. According to some studies recently undertaken by Mr. Grout, at the Herbarium of Columbia College, the description of this variety under the name is antedated by *P. repens* var. *orthocladon* Kindb., showing that Kindberg did not sufficiently study and compare his variety with European exsiccatae, and that Limpricht was not aware that an American name antedated his description. A similar case occurs in *Climacium*, where Austin published in the Musci App. No. 289. 1874, a variety of *C. Americanum*, which he called var. *fluitans*. Subsequently Renauld and Cardot published a description (Bot. Gaz. **15**: 59. 1890) for this same variety under the name of *C. Americanum* var. *Kindbergi*, a name much less suitable and acceptable to us than Austin's for this aquatic form of the species. It is interesting to learn that

there also exists a variety *fluitans* of *C. dendroides*, which also grows floating on the edges of ponds and lakes, while the normal form of both species may be found higher up on the dry banks. E. G. BRITTON.

Elements of Plant Anatomy. By Emily L. Gregory, Ph. D. Ginn & Co., Boston.

The present small volume of 150 pages is a welcome addition to the few works which deal exclusively with plant anatomy. The author's preface defines the scope of the work, and if it is taken within the definition of its writer we consider it a very excellent guide to the study of plant anatomy for beginners, especially if it is accompanied by class-room work.

The book begins with a general description of the morphology of the plant cell, and is followed by a study of the cell-wall, in which the morphology and the chemical modifications are described. This second chapter is, we think, a very excellent one. In chapter 3, upon cell-contents, the general chemical features of the cytoplasm and the nucleoplasm, in view of the vast amount of recent cytological work, might have been more definite and extended; especially could this be said of the process of karyokinesis. Chapter 4, upon the tissues, is brief and might have been better illustrated. It deals with the general anatomy of the tissues and serves as an introduction to chapter 5, which treats of the anatomical features of the Algae, Fungi, Lichens and Thallose Hepaticae; and to chapter 6, which deals with the details of the anatomy of the Cormophytes, the Mosses, Ferns, Monocotyledons and Dicotyledons. Chapter 7 describes the secondary growth of the stems of Dicotyledons and Gymnosperms, and is an excellent condensed account of this somewhat complicated process.

The book is one that is especially intended as a class-room work to follow a given line of lectures, and as such the fewness of the illustrations may not be said to constitute a fault, but a few more would certainly add to its value. There is a lack of bibliographical references which we think would serve as a direct stimulus to further work to a few students at least. The author is perhaps fuller on some controversial points still in dispute than one would expect in a work of this size, but this, when supplemented by oral teaching, could be put in proper correlation with the rest.

The book is in no sense a work for technical students, and in this respect may lose a certain amount of influence that it otherwise would gain.

On the whole the work is timely, as there has been little published in this country which makes such an easy and yet comprehensive introduction to the work of Sachs, DeBary and Vines. Hitherto, the student has had, in the main, to search through a mass of detail in these works to find the underlying principles, but in Dr. Gregory's work the main facts are outlined clearly, in excellent English, and the book loses nothing of its scientific value by being simple and concise.

S. E. J.

Proceedings of the Club.

WEDNESDAY EVENING, JANUARY 29TH, 1896.

Dr. Britton occupied the chair and there were 38 persons present.

The following persons were elected active members:

Miss Helen A. Parsons, Miss Helen M. Smith, Dr. Max Mayer, Miss Laura Skinner, Mr. James A. Kelsey, Dr. Albert Schneider, Dr. E. H. James, Mr. Frank G. Hills, Mr. Charles H. Allen and Mr. Eustice H. Gane.

The club then listened to the reading of the announced papers.

Dr. Valery Havard, in his paper on "Drink Plants of the North American Indians," discussed three classes of such plants: first, those like Maguay and Maize, yielding alcoholic beverages; second, those like *Lophophora* and *Ilex vomitoria*, yielding beverages which intoxicate or stimulate, but not by virtue of alcoholic constituents; third, those like Chia seeds and *Rhus* fruits, yielding beverages drunk only for their refreshing properties. The paper was discussed by Dr. Britton and Dr. Rusby, and is published in full in this issue of the BULLETIN.

Dr. John K. Small was unable to present his paper, "Preliminary Notes on the North American species of *Saxifraga*" in full, owing to delay in the receipt of material required for study. He proposed to separate from *Saxifraga* two new genera, *Jepsonia* and *Saxifragopsis*, as published in the January BULLETIN.

Dr. N. L. Britton proposed a number of new species of Cyperaceæ, reducing two others, and contributing a large number of interesting notes upon this family.

Dr. Britton also upheld Pursh's *Lilium umbellatum*, which has usually been accepted in herbaria as *L. Philadelphicum*. His position was supported by numerous specimens, and was endorsed by Mr. Rydberg.

TUESDAY EVENING, FEBRUARY 11, 1896.

The President occupied the chair and there were 38 persons present.

Miss E. J. Stone and Miss Susie E. Brown were elected active members.

Mr. A. A. Heller read his announced paper, "Botanizing in Hawaii." The paper was illustrated by lantern views and was listened to with great interest. It was discussed by the President, Dr. Britton, Mr. Gilbert and the Secretary, after which Mr. Heller communicated furthed observations on the subject.

Mr. Arthur Hollick was unable to be present to read his paper entitled "Leguminous Pods from the Yellow Gravel Sandstone at Bridgeton, N. J." In his place Dr. Britton presented the chief points in connection with the subject, exhibiting specimens of the fossils. The paper is published in this issue of the BULLETIN.

Mr. B. D. Gilbert announced that he had brought to the meeting some specimens of a peculiar species of *Ophioglossum* from Iceland, which he invited the members to examine.

Index to recent Literature relating to American Botany.

Bastin, E. S. and **Trimble, H.** A Contribution to the Knowledge of some North American Coniferae. Am. Journ. Pharm. **68**: 65–72. *f. 9.* F. 1896.

Bescherelle, E. Essai sur le genre *Calymperes*. Ann. des Sci. Nat. (8) **1**: 247–308. 1895.

Four species from the United States are recognized, *C. disciforme*, *C. Donnellii*, *C. Richardi* and *C. Brittoniae*, Besch. a new species, collected by J. D. Smith in in Florida in 1880. *C. crispum* is referred to *Syrrhopodon crispus* Aust, as originally described.

Bessey, C. E. The Box-Elder on the Plains. Gard. & For. **9**: 33. 22 Ja. 1896.

Botanical Seminar, University of Nebraska. Additions to the reported Flora of the State. Rep. Bot. Surv. Neb. 4: 24–48. 20 Ja. 1895. Contributions by Messrs. Rydberg, Saunders, Elmore, Pound and Clements.

Coville, F. V. Botany of Yakutat Bay, Alaska, with a Field Report by F. Funston. Contr. U. S Nat. Herb. **3**: 325–353. 15 Ja. 1896.

Glatfelter, N. M. Relations of *Salix Missouriensis* Bebb, to *S. cordata* Muhl. Trans. Acad. St. Louis, **7**: 137–144 *pl. 3*. 4 Ja. 1896.

Greene, E. L. Eclogae botanicae, No. 2. Proc. Acad. Phila. **1895**: 546–554. 1 F. 1896.

New species in *Trifolium*, *Boisduvalia*, *Valerianella*, *Lessingia*, *Pyrrocoma*, *Aster* and *Vagnera*. Revision of *Tropidocarpum*.

Holzinger, J. M. Report on a Collection of Plants made by J. H. Sandberg and Assistants in northern Idaho, in the Year 1892. Contr. U. S. Nat. Herb. **3**: 205–287. *pl. 4*. 23 N. 1895.

New species in *Cardamine*, *Peucedanum*, *Dicranoweisia*, *Orthoumtrich*, *Bryum*, *Plagiothecium* and *Peronospora*.

Hooker, J. D. *Stanhopea Haseloviana*. Curt. Bot. Mag. **52**: *pl. 7452*. Ja. 1896.

Native of Peru.

Jenman, G. S. *Asplenium* (*Daraea*) *Perkinsii*. Gardn. Chron. **19**: 8. 4 Ja. 1896.

A new species from British Guiana, with notes on *A. Willdenovii*.

Jenman, G. S. Ferns: Synoptical List.—XXVII.–XXVIII. Bull. Bot. Depart. Jamaica, **1**: 75, 85. My.–Je. 1894.

Jenman, G. S. Ferns: Synoptical List.—XXIX.–XXXI. Bull. Bot. Depart. Jamaica, **2**: 195, 266, 285. S.–D. 1895.

Le Jolis, A. Remarques sur la Nomenclature Hépaticologique. Mém. Soc. Nationale Sci. Nat. Math. Cherbourg, **29**: 105–182. 1892–95.

Contains references to American Hepatics.

MacFarlane, J. M., and **McElwee, A.** Botanic Garden of the University of Pennsylvania. Exchange List of Seeds collected during 1895. Pamph. pp. 8. Philadelphia. D. 1895.

Macoun, J. M. Contributions from the Herbarium of the Geological Survey of Canada—V., VI., VII. Can. Rec. Sci. Ja. Ap. Jl. 1895. Reprinted.

Record of numerous localities.

Meehan, T. *Hepatica triloba.* Meehans' Month. **6**: 21 *pl. 2.* F. 1896.

Meehan, T. *Liparis liliifolia.* Meehans' Month. **6**: 1. *pl. 1.* Ja. 1896.

Moore, S. LeM. The phanerogamic Botany of the Matto Grosso Expedition, 1891–92. Trans. Linn. Soc. London (II.) **4**: 265–516. *pl. 21–39.* D. 1895.

Descriptions of many new species.

Noak, F. Neuere, in den östlichen Staaten Nord-Amerikas aufgetretene Pflanzenkrankheiten. Zeitschr. Pflanzenkrankheiten, **5**: 336–342. 1895.

A résumé of the work published by B. D. Halsted, of the New Jersey Agricultureal Experiment Station, 1891–93.

Pound, R. and **Clements, F. E.** New Species of Fungi. Rep. Bot. Surv. Neb. **4**: 5–23. 20 Ja. 1896.

Descriptions of 54 species from Nebraska. *Trichurus* Clements & Shear is a new genus and *Gymnochilus* a new generic name proposed for *Psathya* Fr.

Penzig, O. Considérations générales sur les anomalies des Orchidées. Mém. Soc. Nationale Sci. Nat. Math. Cherbourg. **29**: 79–104. 1892–95.

Several American orchids are mentioned.

Pasquale, F. *Elodea Canadensis* Rich. nelle provincie meridioneli d' italia. Bull. Soc. Bot. Ital. **1896**: 5 Ja. 1896.

Rimbach, A. Durch Wanzen verursachte Schädigung des Cacao im Küstenlande von Ecuador. Zeitschr. Pflanzenkrankheiten, **5**: 321–324. 1895.

Rydberg, P. A. Flora of Nebraska. Part. 21, Rosales. 8vo. pp. 82. *figs.* 30 D. 1895.

Sargent, C. S., Editor. Plane Trees. Gard. & For. **9**: 51. *f. 6.* 4 F. 1896.

Schumann, K. *Echinocactus Trolliettii.* Monatssch. Kakteenk. **5**: 184. D. 1895.

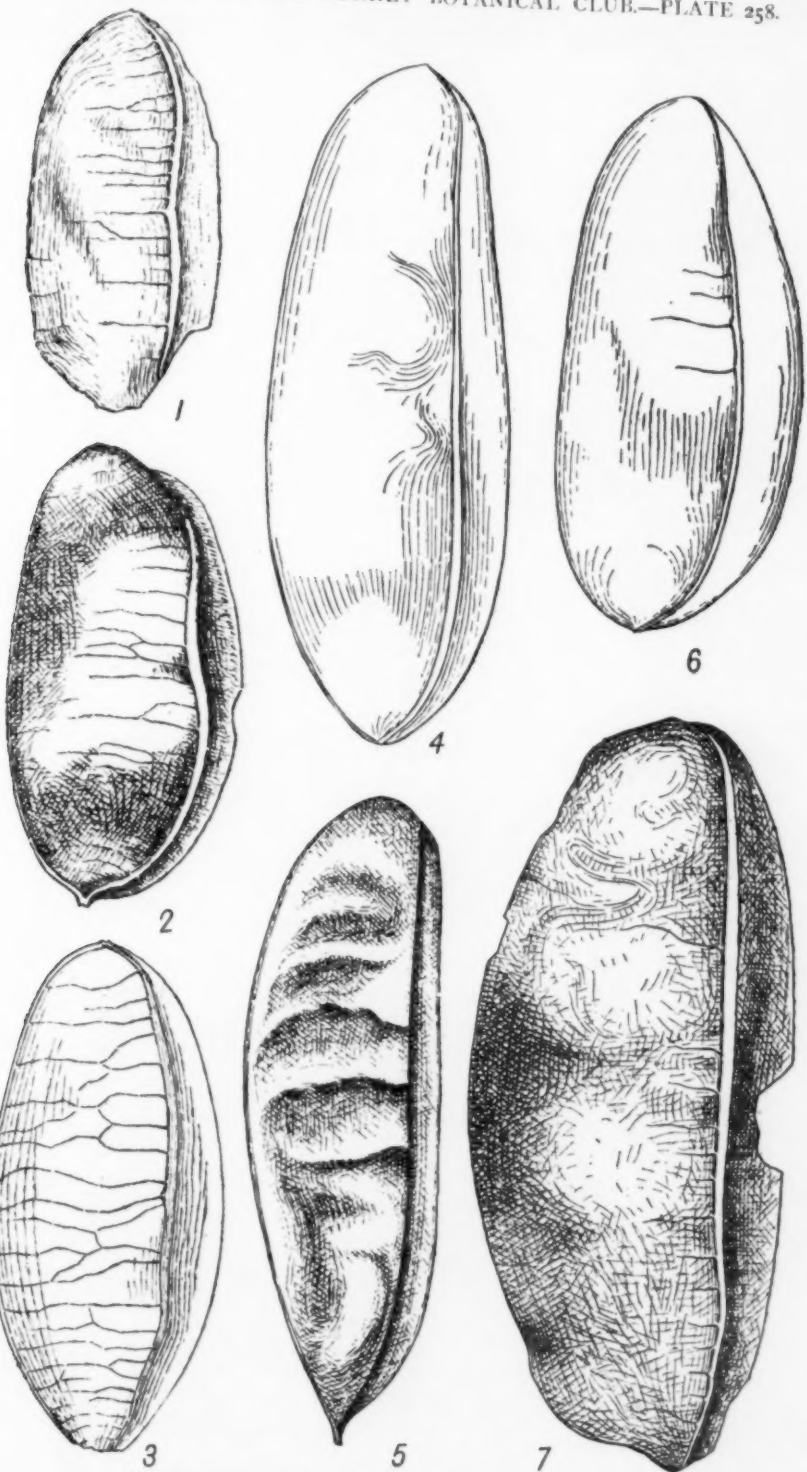
Thaxter, R. New or peculiar aquatic Fungi.—II. Bot. Gaz. **20**: 477–485. *pl. 31.* 17 N. 1895.

Describes *Gonapodya polymorpha* and *Myrioblepharis paradoxa*, new species.

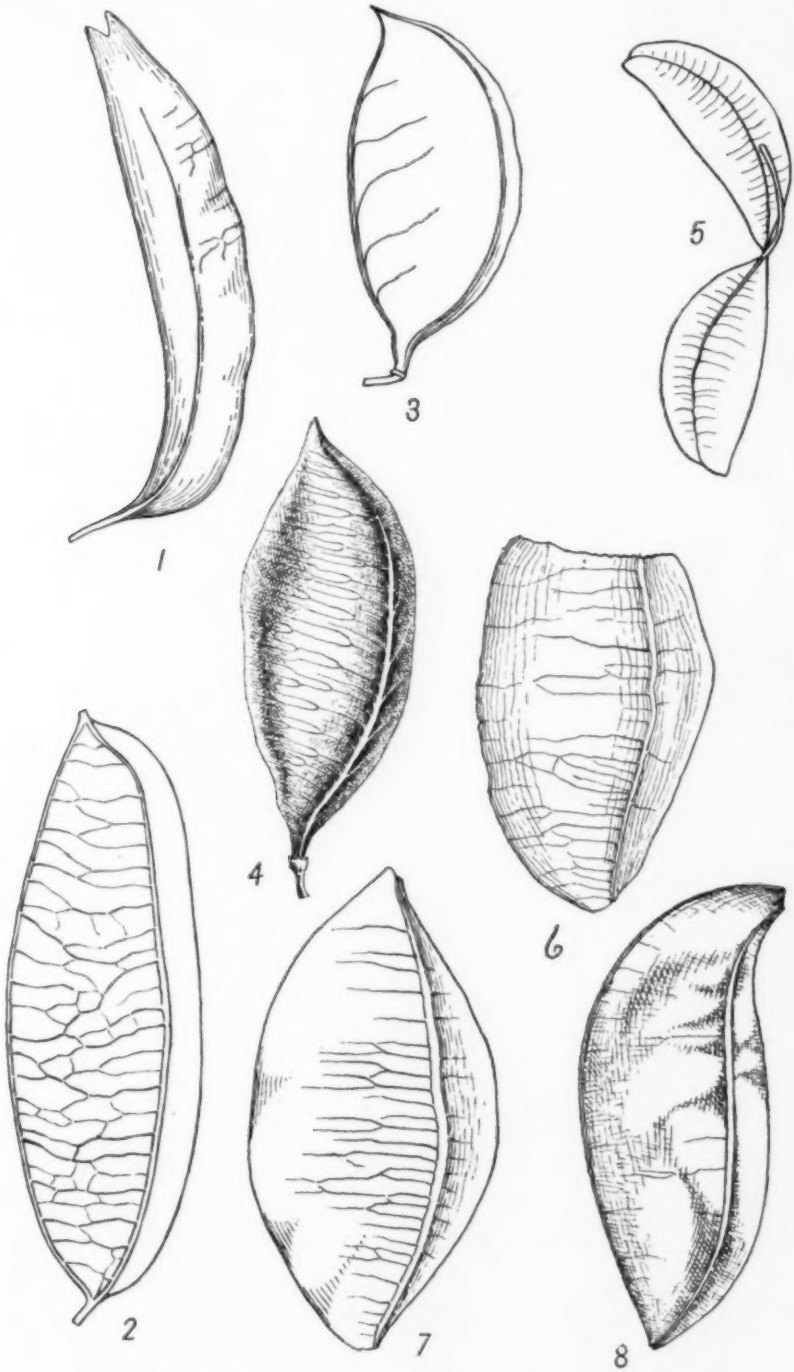
Thaxter, R. New or peculiar American Zygomycetes.—I. Bot. Gaz. **20**: 513–518. *pl. 34.* 16 D. 1895.

Dispira Americana, new species.

Toumey, J. W. *Opuntia arborescens* in the Southwest. Gard. & For. **9**: 2. *f. 1.* 1 Ja. 1896.



MEZONEURUM BRIDGETONENSE HOLLICK.



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